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LIFE HISTORY STUDIES ON MEXICAN BUTTERFLIES

III. NINE RHOPALOCERA (PAPILIONIDAE, NYMPHALIDAE, LYCAENIDAE) FROM OCOTAL CHICO, VERACRUZ

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OCOTAL CHICO (meaning "small pine ridge") is a small Popoluca Indian village in southern Veracruz, Mexico, and in the eastern section of the Sierra Tuxtla. The village is situated at an elevation of 1900 feet above sea level and on one of several ridges that radiate down the leeward slope of Volcán Santa Marta, the second highest peak in the Tuxtlas (elevation 5100 ft.). This volcano is presently inactive and is covered with virgin rain forest. The actual crater is surrounded by "elfin" forest. The lower ridges, however, are covered with tall stands of pine (*Pinus oocarpa* Schiede) and some oak (*Quercus* spp.). These ridges slope (sometimes very steeply) down to small, clear streams; the vegetation on them becomes increasingly richer in hardwoods so that the actual streams are bordered by dense stands of secondary rain forest.

In the summer of 1963, I spent three months at Ocotál Chico collecting on the slopes of Volcán Santa Marta. During that period, I was able to rear the immatures of nine species of butterflies: *Parides photinus* (Doubleday), *Papilio thoas autoctes* Rothschild & Jordan, *Heliconius petiveranus* Doubleday, *Eueides cleobaea zorcaon* (Reakirt), *Dryas julia delila* (Fabricius), *Euptoieta hegesia hoffmanni* W. P. Comstock, *Chlosyne janais* (Drury), *Eumaeus minyas* Hübner, and *Eumaeus debora* Hübner. Since the life histories of three of these species (*P. photinus*, *H. petiveranus*, and *E. minyas*) have not been reported previously, and references to the immatures of the remaining species are often incomplete and inaccessible to most North American workers, I am presenting detailed descriptions.

Terminology is based on that of Fracker (1925) and Peterson (1948).

All drawings and photographs are by the author. All measurements are based on living material (larval measurements are based on specimens in a state of rest).

All preserved material is in the author's personal collection.

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FAMILY PAPILIONIDAE

Parides photinus Doubleday

The life history of this species has not been reported previously in the literature.

EGG: Fig. 1A. (Measurements and durations are based on 7 specimens.) Height (excluding pedicel), 2.4-2.5 mm.; width, 2.2-2.4 mm. Duration of stage, 6-7 days.

Spherical with 14-15 irregular ridges radiating from micropyle. Numerous circular-oblong elevations on surface. Egg attached to an oblong, ridged, pedicel concolorous with egg.

Color brownish orange, acquiring a purple tinge the day prior to larval emergence.

Eggs are deposited singly on the undersurfaces of the leaves of *Aristolochia asclepiadifolia* T. S. Brandeg. (Aristolochiaceae). I found this vine growing only at one locality on the outskirts of the village.

FIRST INSTAR LARVA: Fig. 2A. (Measurements and duration are based on 6 specimens) Beginning of stadium-length, 3.2-3.4 mm.; maximum width, 0.9-1.1 mm.; head diameter, 0.7-0.8 mm. Termination of stadium-length, 6.5-6.7 mm.; max. width, 1.8-1.9 mm. Duration, 4 days.

Head (fig. 5A) black with several tiny, fine, simple setae. Ocelli brown.

Body expanded slightly in anterior portion. Segments with paired, simple, black setae and paired scole with black spinules (all scole concolorous with ground color except when mentioned otherwise): prothoracic-2 dorsal setae (1 anterior, 1 posterior), 1 subdorsal seta (post.), 1 supraspiracular scolus, 1 spiracular scolus; mesothoracic-1 dorsal seta, 1 subdorsal scolus with spines forked at tips, 1 lateral seta with a forked tip, 1 supraspiracular scolus with spines forked at tips, 1 subspiracular scolus; metathoracic-1 subdorsal scolus with spines forked at tips, 1 lateral seta, 1 supraspiracular scolus with spines forked at tips, 1 subspiracular scolus; first through eighth abdominal-1 subdorsal scolus (red on first, second, third, fifth, sixth, and eighth segments) with spines forked at tips, 1 lateral seta with a forked tip, 1 supraspiracular scolus (red on same segments innumerated above), 1 subspiracular scolus (red as the above); ninth abdominal-1 subdorsal scolus, 1 supraspiracular seta, 1 subspiracular seta; tenth abdominal-1 subdorsal scolus. Suprapedal lobes on all segments with 2 setae arising from verucca.

Ground color orangish red. Single, small, cream saddle on latero-posterior section of third abdominal segment and on lateroanterior section of fourth abdominal segment. Legs with claws black; prolegs concolorous with ground color. Spiracles brown. Osmateria yellow.

SECOND INSTAR LARVA: (Measurements and duration are based on 6 specimens.) Beginning of stadium-length, 6.9-7.2 mm.; width, 1.0-1.4 mm.; head diameter, 1.1 mm. Termination of stadium-length, 9.9-10.6 mm.; width, 2.9-3.5 mm. Duration, 4 days.

Head as before.

Body shape as before. Segments with paired setae and scole as before unless otherwise mentioned: prothoracic-cervical shield with 2 dorsal setae, 1 subdorsal seta, 1 supraspiracular scolus (black), remainder of segment with 1 spiracular scolus (red); mesothoracic-1 subdorsal scolus (red with tinge of orange), 1 supraspiracular scolus (red); metathoracic-1 subdorsal scolus (red with tinge of orange), 1 supraspiracular scolus (red), 1 subspiracular scolus (red); first abdominal-1 subdorsal scolus, 1 supraspiracular scolus (red), 1 subspiracular scolus (red); second through eighth abdominal-1 subdorsal scolus (red on second, third, fifth, sixth, and eighth segments), 1 supraspiracular seta, 1 subspiracular scolus (red on second, fourth, fifth, sixth, and eighth segments); caudal (fused ninth and tenth segments)-subdorsal scole now reduced to small "knobs", otherwise, the same as before. No setae are forked.

Ground color redder than before. Saddle more evident than before. Legs, prolegs, spiracles, and osmateria as before.

THIRD INSTAR LARVA: (Measurements and duration are based on 4 specimens.) Beginning of stadium-length, 11.0-12.0 mm.; width, 3.1-3.8 mm.; head diameter, 2.1-2.2 mm. Termination of stadium-length, 13.6-15.9 mm.; width, 3.7-4.9 mm. Duration, 6-7 days.

Head as before.

Body shape as before. Cervical shield with numerous setae arising from pinacula. Setae and pinacula. Setae and scole on all other segments in the same arrangements as before. Scole are now very stout and fleshy and the spines are now very much shorter and confined to the terminal portions of the scole. All scole now red with the following exceptions (which are cream with a light orange tinge): supraspiracular on third abdominal segment, subdorsal and subspiracular on seventh abdominal segment. Dense, fine, short, black setae on all segments (these appear as hairs).

Ground color velvety red with a slight orange tinge. Saddle as before. Legs, prolegs, spiracles, and osmateria as before.

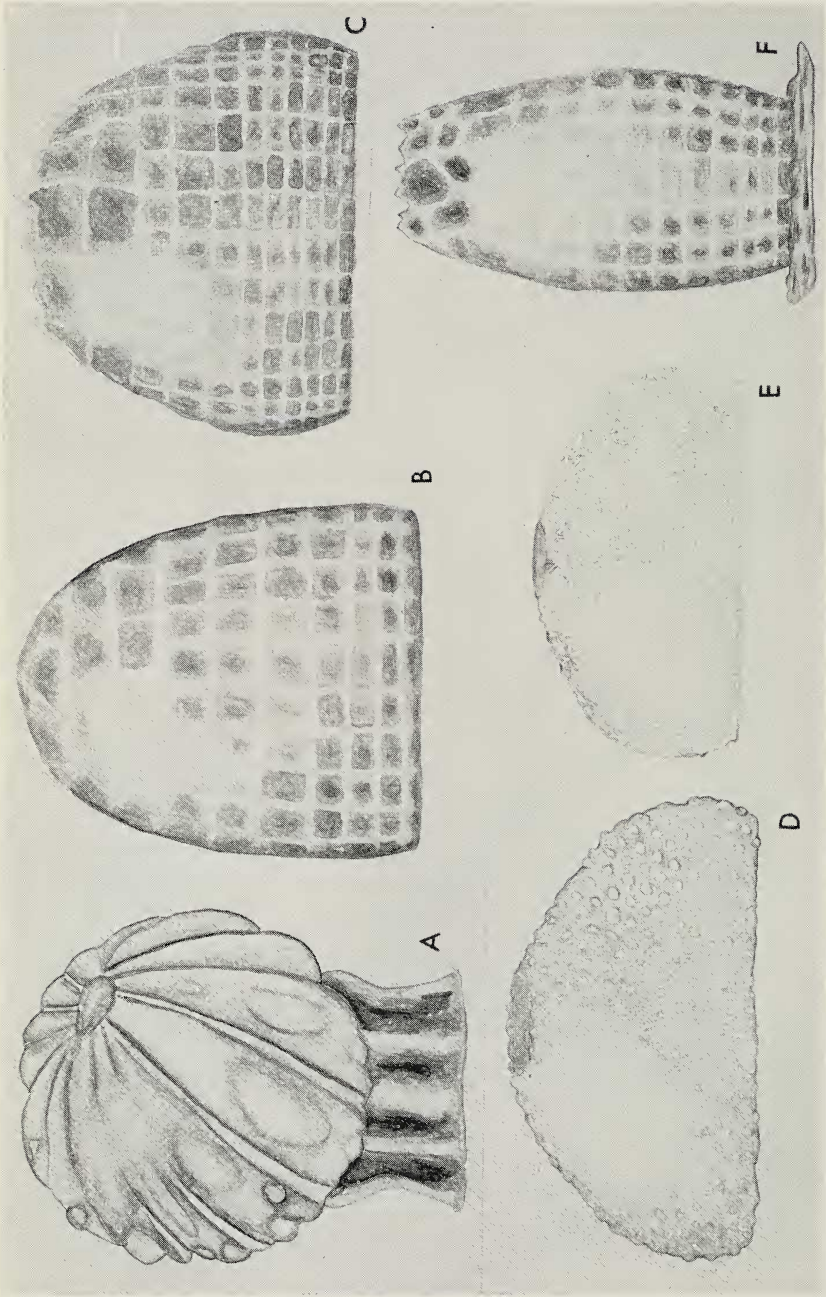


FIG. 1. Eggs of: A, *Parides photinus* D.; B, *Eueides cleobaea zorcaon* R.; C, *Euptoieta hegesta hofmanni* W.P.C.; D, *Eumaeus minyas* H.; E, *Eumaeus debora* H.; F, *Heli-conius petiveranus* D.

FOURTH INSTAR LARVA: (Measurements and duration are based on 3 specimens.) Beginning of stadium-length, 14.0-15.2 mm.; width, 4.1-4.9 mm.; head diameter 2.8-3.0 mm. Termination of stadium-length, 18.6-19.9 mm.; width, 4.4-5.0 mm. Duration, 6-7 days.

Head as before.

Body shape as before. Setae and scole in same arrangement as before. The pair of supra-spiracular scole on the prothoracic segment and the pair of subdorsal scole on the first abdominal segment are now greatly reduced. Scole with same colors as before with the following exception: the subdorsal on the fourth abdominal segment is now red. Sparse, simple, small, black setae or hairs scattered irregularly on all segments.

Ground color dark reddish black with saddle very conspicuous. Legs, prolegs, spiracles, and osmaterias as before.

FIFTH INSTAR LARVA: (Measurements and duration are based on 3 specimens.) Beginning of stadium-length, 19.1-21.7 mm.; width, 4.8-5.7 mm.; head diameter, 3.7-4.0 mm. Termination of stadium-length, 27.7-30.3 mm.; width, 6.6-8.0 mm. Duration, 7-8 days.

There is no deviation from the previous stage except that the ground color is now velvety black with only a tinge of red showing up on the suprapedal lobes.

SIXTH INSTAR LARVA: Fig. 2B. (Measurements and duration are based on 2 specimens.) Beginning of stadium-length, 32.1-34.2 mm.; width, 8.7-9.9 mm.; head diameter, 4.5 mm. Termination of stadium-length, 47.1-51.9 mm.; width, 12.0-14.6 mm. Duration, 9-10 days.

Head with more setae than before (fig. 5B).

There is no significant deviation from the previous stage except that the reddish tinge on the suprapedal lobes is now less evident. Fig. 2B illustrates a mature larva.

Three days prior to pupation, the larva attaches the caudal end to the substrate and spins a silken girdle around the thoracic region of the body.

PUPA: Fig. 6A. (Measurements and duration are based on 1 specimen.) Length, 33.6 mm.; maximum width, 17.4 mm. Duration of stage, 17 days.

Head portion with two small dorsal horns protruding anteriorly. Antennae extending slightly beyond wing margins. Proboscis slightly shorter than wing cases.

Body with first three abdominal segments greatly expanded laterally in the typical *Battus Parides* form. Also, third through sixth abdominal segments each with a pair of dorsal keels. Cremaster with numerous black hooks. There is a thoracic girdle.

Ground color a dull light green except dorsal surface which is chartreuse.

IMAGO: Fig. 8D. Adults were common in and around the borders of the tropical forests, never in the pine woods. This species was one of the few species of papilionid that I took regularly in the virgin rain forests on the upper slopes of the volcano. In that environment, oviposition was probably on something other than *Aristolochia sclepiadifolia* for I failed to observe that plant growing there.

Hoffmann (1940) gives the Mexican range of this species as the warm and hot regions of the two coasts, the Rio Balsas Valley, Michoacan, Jalisco, and Chiapas.

Papilio thoas autocles Rothschild and Jordan

There are several references in the literature regarding the immature stages and food plants of this species. However, most of these refer to the South American subspecies *P. t. thoas* L. The references are: Burmeister (1878)-description and illustrations of a larva and pupa, records larval food plant as *Piper citrifolium* Lam.; Comstock and Vazquez (1961)-descriptions and illustrations of a larva and pupa, records *Citrus* (lemon) and *Piper* sp. as larval food plants; Ehrlich (1961)-records *Citrus* as the larval food plant; Fassl (1909)-brief mention of ovum; Hoffmann (1937)-brief description of ovum, early and late instar larvae, and records orange as the larval food plant; Holland (1931)-records *Ptelea*, *Xanthoxylon*, and *Citrus* as larval food plants; Jones (1882)-brief mention of larva and pupa, records orange as the larval food plant; Moss (1919)-brief mention of egg, early and late instar larva, illustrations of fourth, fifth instar larva and pupa, and records orange, lemon, *Piper aduncum*, *Piper belemense* as the larval food plants.

FIRST INSTAR LARVA: Fig. 2D. (Measurements and duration are based on 3 specimens.) Beginning of stadium-length, 2.8-2.9 mm.; maximum width, 0.8-0.9 mm.; head diameter, 0.9 mm. Termination of stadium-length, 5.5-5.7 mm.; maximum width, 1.7-1.9 mm. Duration, 4-5 days.

Head (fig. 5E) coffee brown with numerous black, simple setae arising from small chalazae.

Body expanded anteriorly (thoracic segments and first abdominal segment) into a "false head";

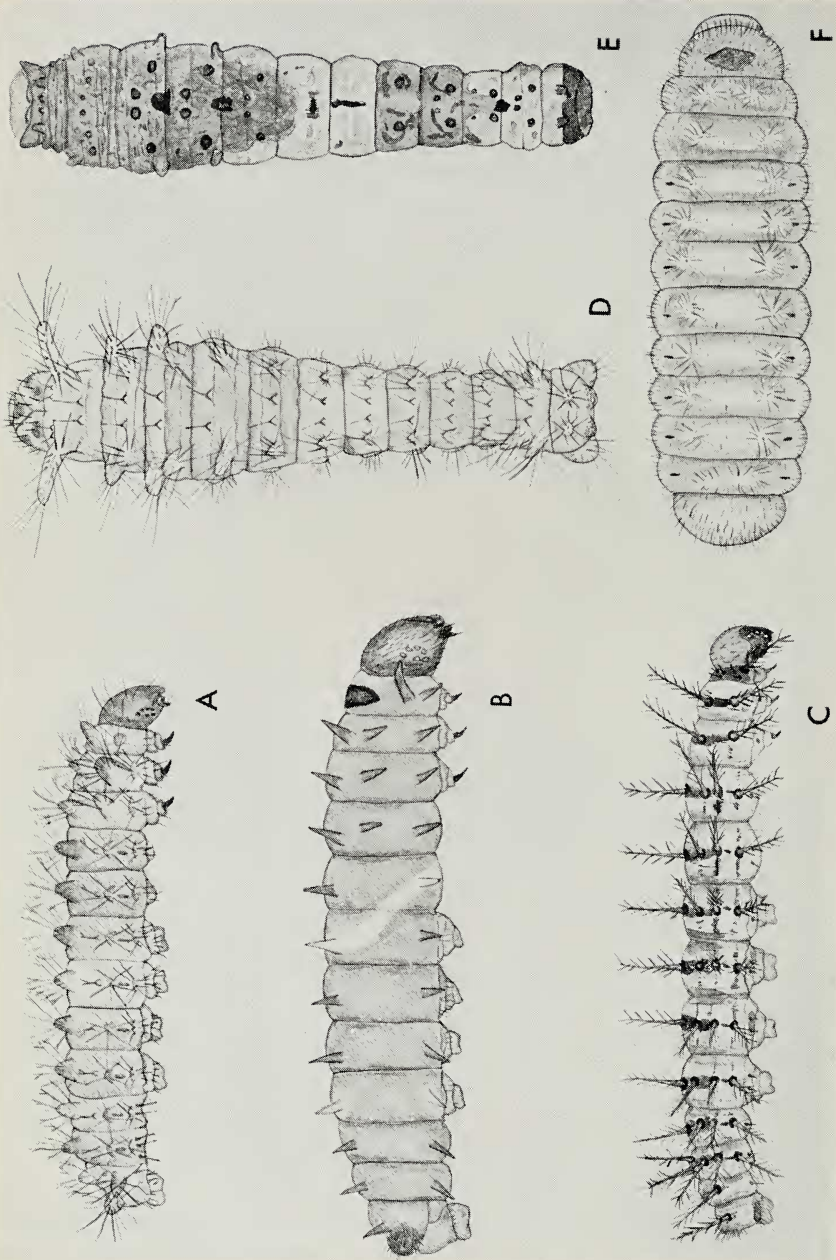


Fig. 2. Larvae: A, 1st instar and B, 6th instar of *Parides photinus* D.; C, Last instar of *Chlosyne janais* D.; 1st instar and E, 3rd instar of *P. thoas autocles* R. and J., F, 4th instar of *Eumaeus debora* H.

the eighth and ninth abdominal segments expanded very slightly, too. Segments with paired simple, black setae and paired scole with black spinules (all scole concolorous with ground color except when otherwise mentioned): all segments with 1 dorsal seta; prothoracic-1 subdorsal scolus, 1 lateral scolus (long), 1 spiracular-subspiracular scolus; meso- and meta-thoracic-1 subdorsal scolus, 1 lateral scolus (shorter than on previous segment), 1 subspiracular scolus; abdominal-1 subdorsal scolus (large and posterior on eighth segment, large and anterior on ninth segment, thus giving the appearance of a forked scolus), 1 supraspiracular scolus, 1 subspiracular scolus; caudal-suranal plate with numerous short setae; suprapedal lobes with several setae.

Ground color glossy, coffee brown. Two cream saddles: one on portions of second, third, and fourth abdominal segments and one on portions of seventh, eighth, and ninth abdominal segments. Venter bluish grey. Legs dark brown; prolegs bluish grey. Spiracles inconspicuous. Osmateria reddish orange.

Newly hatched larvae were found on the upper surfaces of the leaves of both *Piper marginatum* Jacq. and *Piper kerberi* C. DC. (Piperaceae). These plants were common along the shaded stream banks and in the tropical forests on the slopes above the streams. It is interesting to note that when larvae taken on *P. marginatum* were offered leaves of *P. kerberi*, they accepted them without any hesitancy. The reciprocal cross worked equally as well.

(The first molt was missed accidentally.)

THIRD INSTAR LARVA: Fig. 2E. (Measurements and duration are based on 3 specimens.) Beginning of stadium- length, 13.0-13.6 mm.; maximum width, 3.6-3.8 mm.; head diameter, 2.3-2.4 mm. Termination of stadium- length, 19.5-20.6 mm.; max. width, 5.7-6.4 mm. Duration, 5 days.

Head (fig. 5F) coffee brown with dense, fine, simple, tan setae.

Body shape as before. All setae as before but very inconspicuous. All scole now reduced to small rounded knobs topped with fine, tan, simple setae. Supraspiracular scole on abdominal segments and spiracular and subspiracular acole on all segments now entirely absent. The lateral pairs on the prothoracic segment are still the most prominent scole.

Ground color browner than before but still glossy. Dorsal and ventral surfaces with numerous white-grey-cream irregularly shaped blotches and lines giving the larvae a mottled appearance and a remarkable resemblance to bird excrement. Small, light blue dots dorsal to the above mentioned knobs and ventral to the spiracles. Cream saddles now very evident. Legs, prolegs, spiracles, and osmateria as before.

FOURTH INSTAR LARVA: (Measurements and duration are based on 2 specimens.) Beginning of stadium- length, 22.0-23.2 mm.; maximum width, 7.3-7.9 mm.; head diameter, 3.0-3.5 mm. Termination of stadium- length, 27.0-28.9 mm.; max. width, 7.3-7.9 mm. Duration, 6 days.

Head as before.

Body as before except that the light markings on the dorsal and lateral surfaces are now more extensive.

FIFTH INSTAR LARVA: (Measurements and duration are based on 2 specimens.) Beginning of stadium- length, 33.1-34.3 mm.; maximum width, 8.0-9.1 mm.; head diameter, 4.1-4.3 mm. Termination of stadium- length, 51.2-55.6 mm.; max. width, 10.2-12.1 mm. Duration, 9 days.

This stage is illustrated by Comstock and Vazquez (1961) and my two specimens showed no deviation from their description. It is interesting to note here that after the fourth molt, the larvae lost their glossy appearance, the integument taking on a dry, wrinkled look.

PUPA: Measurements and duration are based on 2 specimens.) Length, 34.2-35.1 mm.; maximum width, 10.6-11.9 mm. Duration of stage, 10 days.

This stage is illustrated by Comstock and Vazquez (1961), also. My two specimens showed no deviation from their description and I did not make any sketches in the field.

IMAGO: Fig. 8, A, B. Adults were common in the open, sunny areas in and around the village. I frequently observed them sipping moisture from damp areas in the mud.

Ehrlich (1961) lists the range of this species as Florida, southern Texas to Argentina. Hoffmann (1940) records the Mexican subspecies *autocles* as occurring in the warm regions of both coasts.

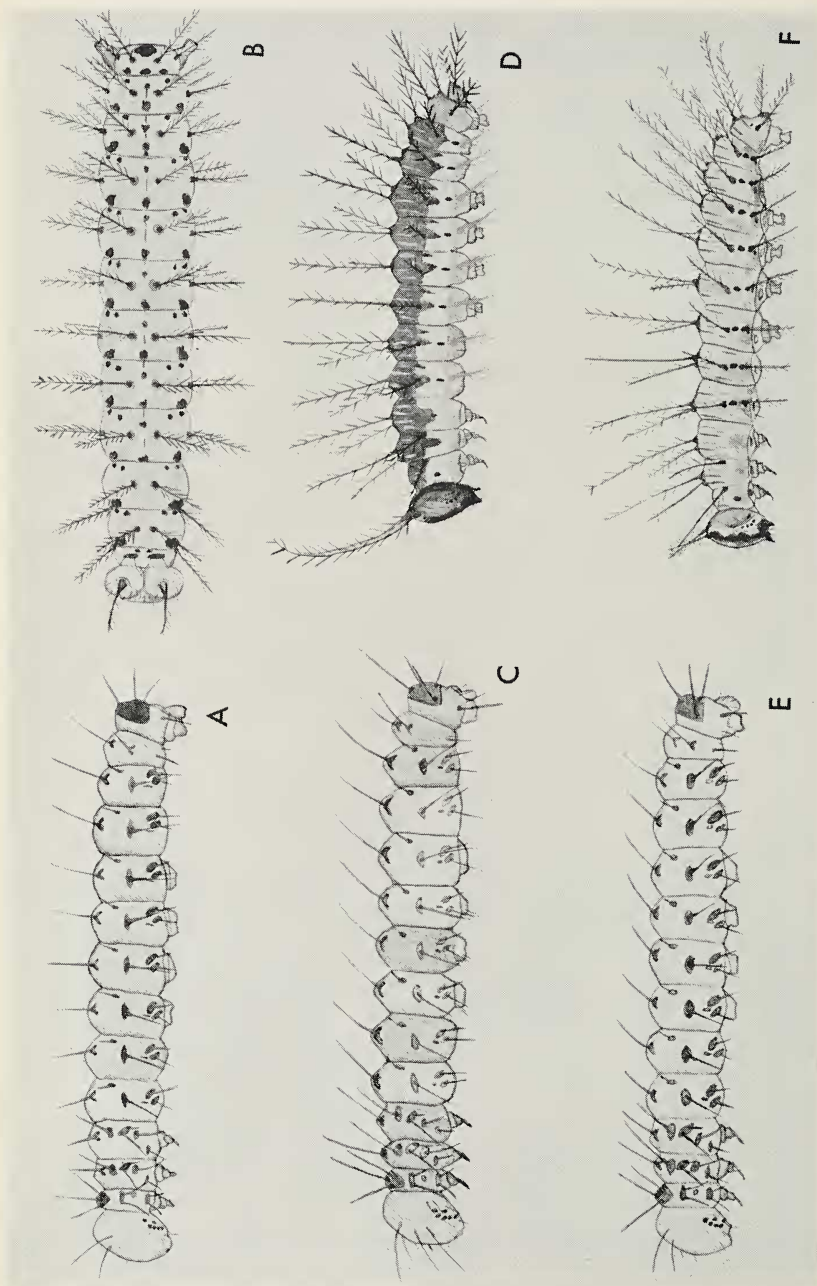


Fig. 3. Larvae: *Heliconius petiveranus* D., A. 1st instar, B. 5th instar; *Eueides cleobaea zorcaon* R., C. 1st instar, D. 5th instar; *Dryas julia delila* F., E. 1st instar, F. 5th instar.

FAMILY NYMPHALIDAE

Heliconius petiveranus Doubleday

The life history of this species has not been reported previously in the literature. Ehrlich (1961) records *Passiflora* sp. as the larval food plant.

EGG: Fig. 1F. (Measurements and duration are based on 5 specimens.) Height, 1, 4-1, 5 mm.; width, 0, 8-0, 9 mm. Duration of stage, 4 days.

Cylindrical in shape. Entire outer surface composed of rectangular reticulations, these less numerous near the micropyle. Micropyle surrounded by an irregular ridge.

Color bright yellow turning orange the day prior to larval hatching.

Eggs are deposited on the undersurfaces of the leaves or on the new tendrils of *Passiflora biflora* Lam. (Passifloraceae), a small vine which grew commonly on the ridge slopes in the deciduous forests. It is interesting to note that while collecting in the vicinity of Laguna Catemaco for a few days in late August of the same year, I noticed females of this species ovipositing both on *P. biflora* and *P. coriacea* Juss. The latter grew in and around the margins of the secondary forests. This area has been discussed in a previous paper (Ross, 1964).

FIRST LARVAL INSTAR: Fig. 3A. (Measurements and duration are based on 2 specimens.) Beginning of stadium-length, 3, 1-3, 2 mm.; width, 0, 3-0, 4 mm.; head diameter, 0, 3 mm. Termination of stadium-length, 4, 5-4, 6 mm.; width, 0, 8-0, 9 mm. Duration, 2 days.

Head (fig. 5C) tannish yellow with numerous small, simple, black setae (the pair on the apex slightly longer than the others).

Body cylindrical. Segments with paired, simple, black setae: prothoracic-cervical shield with 3 arranged in a triangular pattern, 2 supraspiracular, 2 spiracular; meso- and metathoracic-1 dorsal, 1 subdorsal, 2 supraspiracular, 1 spiracular; first through eighth abdominal-1 dorsal, 1 subdorsal (posterior), 1 supraspiracular, 2 subspiracular; ninth abdominal-1 dorsal, 1 subdorsal, 1 supraspiracular, 1 subspiracular (very short); caudal-suranal plate with 3 long and numerous short setae; suprapedal lobes with setae: 2 on prothoracic and fifth abdominal segments, 1 on all other segments.

Ground color yellowish tan, the thoracic and first abdominal segments slightly more yellowish than the remaining segments. Legs and prolegs concolorous with ground color. Spiracles dark brown.

Larvae consume shells after hatching.

SECOND INSTAR LARVA: (Measurements and duration are based on 2 specimens.) Beginning of stadium-length, 5, 1-5, 4 mm.; width, 0, 9-1, 2 mm.; head diameter, 1, 0-1, 1 mm. Termination of stadium-length, 7, 0-7, 4 mm.; width, 1, 6-2, 0 mm. Duration, 3 days.

Head tannish orange with setae as before except apical pair is now replaced by a pair of spiny, black scole, 0, 9 mm. in length.

Body shape as before. Segments with paired, simple, black setae and apical black scole with spinules: prothoracic-cervical shield divided so that there are 3 distinct setae, per half, remainder of segment with 2 supraspiracular setae, 2 spiracular setae, 1 supraspiracular scolus at juncture of pro- and mesothoracic segments; mesothoracic-1 dorsal-subdorsal scolus, 2 supraspiracular setae, 1 scolus at juncture of meso- and metathoracic segments; metathoracic-1 dorsal-subdorsal scolus, 2 supraspiracular setae; first through eighth abdominal-1 dorsal-subdorsal scolus, 1 supraspiracular scolus, 1 subspiracular scolus; ninth abdominal-1 dorsal-subdorsal scolus, 1 supraspiracular seta, caudal-1 dorsal seta, 1 supraspiracular scolus, 3 subdorsal setae, suranal plate with numerous setae; suprapedal lobes with numerous setae.

Ground color tannish orange. Legs black; prolegs concolorous with ground color. Spiracles brown.

THIRD INSTAR LARVA: (Measurements and duration are based on 1 specimen.) Beginning of stadium-length, 8, 1-8, 4 mm.; width, 1, 2-1, 4 mm.; head diameter, 1, 6-1, 8 mm. Termination of stadium-length, 15, 5-15, 9 mm.; width, 2, 1-2, 7 mm. Duration, 4 days.

Head light tan. Paired apical scole slightly larger than before. A pair of rectangular, black patches on median section of frontals and contiguous with the epistomal suture. Ocelli black and set in a black field.

Body shape and with setae and scole as before.

Ground color pale grey with a slight yellow tinge. Segmental junctures pale green. A narrow middorsal greenish-grey band with 2 black, triangular dots per segment (1 anterior, 1 posterior) on all segments except the eighth, ninth, and tenth abdominal. Segments with 1-2 faint, black dots in subdorsal and supraspiracular regions. Legs and prolegs as before. Spiracles black.

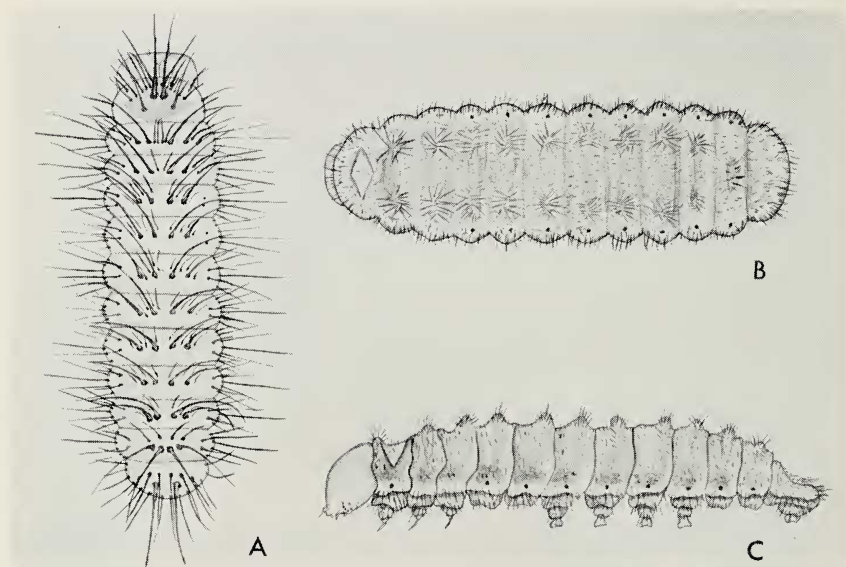


Fig. 4. Larvae: *Eumaeus minyas* H., A. 1st instar, B. and C. 4th instar.

FOURTH INSTAR LARVA: (Measurements and duration are based on 1 specimen.) Beginning of stadium-length, 16.5 mm.; width, 2.5 mm.; head diameter, 2.4 mm. Termination of stadium-length, 20.9 mm.; width, 3.5 mm. Duration, 4 days.

Head as before but pair of apical scoli slightly longer.

Body shape and with setae and scoli as before.

Ground color as before. Middorsal band now yellowish orange, wider and less defined than previously. Black dots slightly more distinct. A lateral, discontinuous, longitudinal, pale white band faintly evident. Legs, prolegs, and spiracles as before.

FIFTH INSTAR LARVA: Fig. 3B. (Measurements and duration are based on 1 specimen.) Beginning of stadium-length, 22.0 mm.; width, 3.8 mm.; head diameter, 3.4 mm. Termination of stadium-length, 26.1 mm.; width, 4.2 mm. Duration, 5 days.

Head (fig. 5D) pale, greyish white with black markings on frontals now larger and more conspicuous. Pair of apical scoli now 2.0 mm. in length.

Body shape and with setae and scoli as before.

Ground color as before. Dorsal band now expanded laterally and contiguous with lateral, white band. Paired black dots now distinct and on all segments in the following arrangement: prothoracic-1 dorsal; mesothoracic through eighth abdominal-1 large anterior supraspiracular, 1 small posterior subdorsal, and 1 small posterior supraspiracular; caudal (fused ninth and tenth segments)-1 anterior supraspiracular. Bases of dorsal-subdorsal scoli with light orange rings.

Two days prior to pupation, the larva attaches the caudal segment to a substrate and hangs suspended head downward. Unfortunately, my one larva accidentally was knocked loose and killed. Hence, I do not have a description of the pupal stage.

IMAGO: Fig. 8, C. Adults were abundant in the general vicinity of the village along the margins of the secondary forests and along the margins of small thickets. They did not occur in the virgin rain forest.

Ehrlich (1961) gives the range of this species as "southern Texas, southward". Hoffmann (1940) records the species as occurring in the warm and hot coastal regions of southern Mexico and Yucatan.

Eueides cleobaea zorcaon (Reakirt)

Four authors have made reference to the immature stages and/or larval food plants of this species--Fassl (1909), brief mention of an egg, and a larva; Seitz (1924)- description of egg, larva (of genus only), pupa, and records *Passiflora* sp. as the larval food plant; Wolcott (1923)- records *Passiflora* sp. as the larval food plant; Wolcott (1936)- records *Passiflora* sp. as the larval food plant.

EGG. Fig. 1B. (Measurements and duration are based on 6 specimens.) Height, 0.8-0.9 mm. Duration of stage, 5 days.

Conical in shape. Outer surface composed of rectangular reticulations, these less numerous near the micropyle.

Color light yellow.

Eggs are deposited on the undersurfaces of the leaves or on the new tendrils of *Passiflora ambigua* Hemsl. (*Passifloraceae*), a vine which grew commonly on many of the fences in the village and on some of the shrubs and trees on the outskirts of the village. The *Populus* say that the fruit of this plant is very tasty.

While collecting near Laguna Catemaco (see under *H. petiveranus*), I noticed females of this butterfly ovipositing on *P. serratifolia* L. exclusively (I did not see *P. ambigua* growing there).

FIRST INSTAR LARVA: Fig. 3C. (Measurements and duration are based on 5 specimens.) Beginning of stadium- length, 1.8-1.9 mm.; width, 0.1-0.2 mm; head diameter, 0.3 mm. Termination of stadium- length, 3.4-3.5 mm.; width, 0.5-0.6 mm. Duration, 4-5 days.

Head (fig. 5K) black with a pair of dorsal tan patches. Numerous fine, simple, black setae on all surfaces (one pair on apex slightly longer than the others).

Body cylindrical. Segments with paired, simple, black setae: prothoracic- cervical shield with 3 arranged in a triangular pattern, 2 supraspiracular, 2 spiracular; meso- and metathoracic- 1 dorsal, 1 subdorsal, 2 supraspiracular, 1 spiracular; first through eighth abdominal- 1 dorsal, 1 subdorsal (posterior), 1 supraspiracular, 2 subspiracular; ninth abdominal- 1 dorsal, 1 subdorsal, 1 supraspiracular, 1 subspiracular (very short); caudal- suranal plate with 3 long setae and numerous shorter ones; suprapedal lobes with setae; 2 on prothoracic, 1 on all other segments.

Ground color very pale greenish white. First, third, fifth, sixth, and seventh abdominal segments with a slight tinge of tan on dorsal and ventral surfaces. Legs and prolegs concolorous with ground color. Spiracles inconspicuous.

Larvae consume shells after hatching.

SECOND INSTAR LARVA: (Measurements and duration are based on 5 specimens.) Beginning of stadium- length, 3.4-3.6 mm.; width, 0.8-1.0 mm.; head diameter, 0.8-0.9 mm. Termination of stadium- length, 5.0-5.9 mm.; width, 1.0-1.2 mm. Duration, 4 days.

Head black with setae as before except apical pair is now replaced by a pair of spiny scole, 1.4 mm. in length; scole black basally but fading to a light grey terminally and tipped with black.

Body shape as before. Segments with paired, simple, black setae and paired scole with black spinules (all scole the same color as those of the head): prothoracic- cervical shield divided so that there are 3 distinct setae per side, the remainder of the segment with 2 supraspiracular setae, 2 spiracular setae, 1 supraspiracular scolus at juncture of pro- and mesothoracic segments; mesothoracic- 1 dorsal-subdorsal scolus, 2 supraspiracular setae, 1 scolus at juncture of meso- and metathoracic segments; metathoracic- 1 dorsal-subdorsal scolus, 2 supraspiracular setae; first through eighth abdominal- 1 dorsal-subdorsal scolus, 1 supraspiracular scolus, 1 subspiracular scolus; ninth abdominal- 1 dorsal-subdorsal scolus, 1 supraspiracular seta; caudal- 1 dorsal seta; 1 supraspiracular scolus, 3 subdorsal setae, suranal plate with numerous setae; suprapedal lobes with numerous setae.

Ground color light greyish green. Venter whitish green. First, third, fifth, and seventh abdominal segments with a brownish tinge; caudal segment cream. Legs and prolegs concolorous with venter. Spiracles inconspicuous.

THIRD INSTAR LARVA: (Measurements and duration are based on 4 specimens.) Beginning of stadium- length, 5.1-5.9 mm.; width, 1.3-1.5 mm.; head diameter, 1.2 mm. Termination of stadium- length, 7.2-8.1 mm.; width, 1.6-2.0 mm. Duration, 5 days.

Head black with a pair of diagonal light grey streaks a bases of scole and a small grey dot in the median section of the clypeus. Setae more numerous than before.

Body shape as before. Paired setae and scole on segments in the same arrangement as before but with the following exception: prothoracic- 2 dorsal setae, 2 subdorsal setae, and 2 supraspiracular setae (all setae arising from black pinacula), 1 supraspiracular scolus at juncture of pro- and mesothoracic segments.

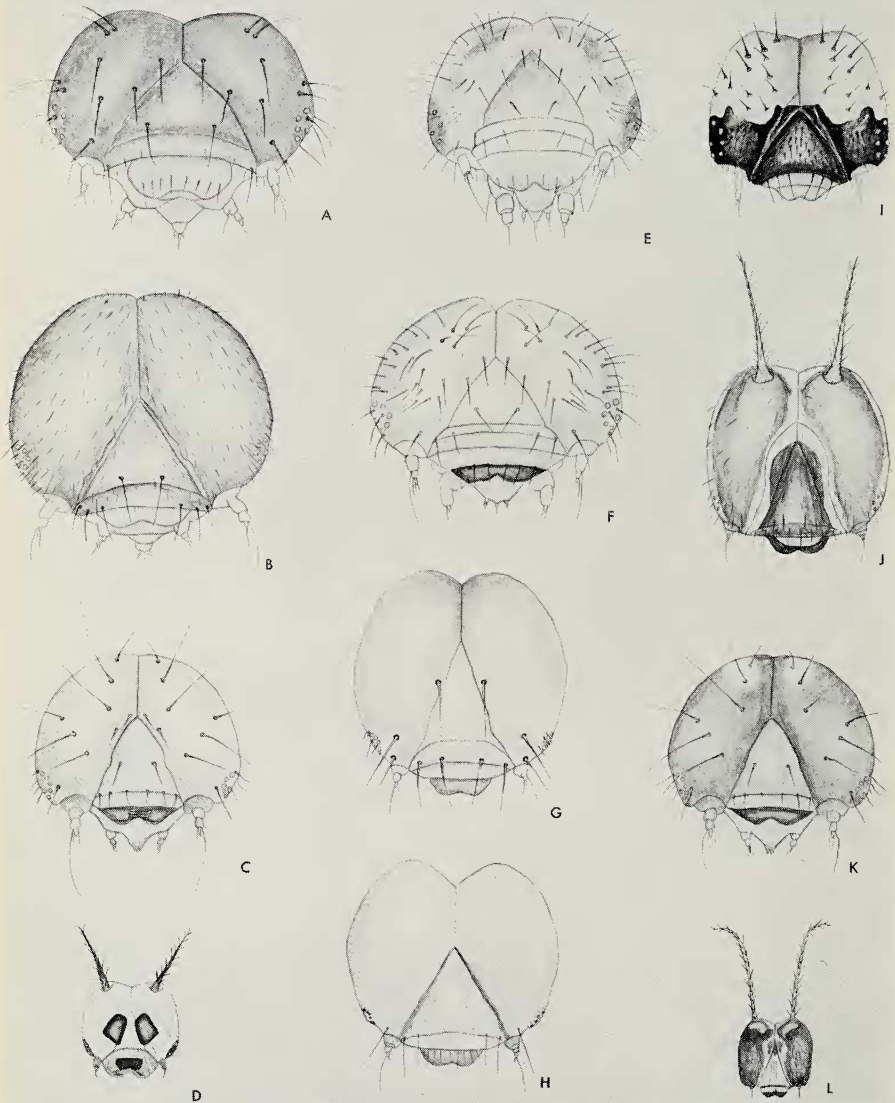


Fig. 5. Larval heads: A. *Parides photinus* D., (1st instar) and B. 6th instar; C. *Heliconius petiveranus* D., 1st instar and D. 5th instar; E. *Papilio thoas antocles* R. & J., 1st instar and F. 3rd instar; J. *Dryas julia delila* F., 5th instar; G. *Eumaeus minyas* H., 1st instar and H. 4th instar; I. *Chlosyne janais* D., last instar; K. *Eueides cleobaea zorcaon* R., 1st instar, L. 5th instar.

Ground color light greyish green but almost obscured by other markings: prothoracic segment with a transverse row of black dots; first through seventh abdominal segments dorsally dark brown with thin, grey streaks and laterally with a narrow, longitudinal, pale yellow band having traces of brown and green; ninth and tenth abdominal segments bright orange. Venter pale green. Legs and prolegs concolorous with venter. Spiracles brown.

FOURTH INSTAR LARVA: (Measurements and duration are based on 4 specimens.) Beginning of stadium- length, 7.5'-8.6 mm.; width, 1.9-2.4 mm.; head diameter, 2.3-2.5 mm.

Termination of stadium- length, 16.0-17.3 mm.; width, 3.2-3.9 mm. Duration, 5 days.

Head as before except that the patches of grey at bases of the scole are now more extensive.

Body shape and with setae and scole as before.

Body with same color patterns as before except that now the meso- and metathoracic segments have some brown on their dorsal surfaces. Legs, prolegs, and spiracles as before.

FIFTH INSTAR LARVA: Fig. 3D. (Measurements and duration based on 4 specimens.)

Beginning of stadium- length, 17.4-18.9 mm.; width, 3.2-3.9 mm.; head diameter, 3.0-3.4 mm.

Termination of stadium- length, 27.4-29.1 mm.; width, 4.3-5.4 mm. Duration, 7-8 days.

Head (fig. 5L) as before but grey at bases of scole now more extensive and now on dorsal surface of scole.

Body with setae and scole as before.

Body with same color pattern as before except that the dorsal brown band is now black with numerous thin, grey streaks. Legs, prolegs and spiracles as before.

Larva turns maroon 3 days prior to pupation and on the day immediately preceding pupation, it takes on a completely yellow appearance.

Larva fastens the caudal segment to the stem of the food plant or other substrate and hangs suspended head downward before pupating.

PUPA: Figs. 6D and E. (Measurements and duration are based on 3 specimens.) Length, 19.5-21.0 mm.; maximum width, 7.0-7.8 mm. Duration, 8-9 days.

Head with 1 pair of anterior projections (approximately 4.0 mm. in length) and 1 pair of dorsal projections (slightly shorter in length than the anterior ones). Antennae and proboscis extending to wing margins.

Segments with projections covered very sparsely with fine, simple setae (hair) (projections relatively short unless otherwise mentioned): thoracic- 1 subdorsal; first abdominal- 1 subdorsal, 1 supraspiracular; second and third abdominal- 1 dorsal, 1 subdorsal (approximately 6.5 mm. in length), 1 supraspiracular; fourth through ninth abdominal- 1 dorsal, 1 subdorsal (bifurcated).

Ground color cream with light greyish green mottling. Spiracles inconspicuous.

IMAGO: Fig. 8, E. Adults were very numerous along the borders of the deciduous woods around the village. This was the most common heliconian in the immediate vicinity of the village.

Hoffmann (1940) gives the Mexican range of this subspecies as the warm and hot regions of the Gulf Coast and Chiapas.

Dryas julia delila (Fabricius)

Several authors have made reference to the food plants or to the immature stages of this species: Beebe, Crane and Fleming (1960) - descriptions of egg, all instar larvae, pupa with illustrations of egg, first and fifth instar larvae and pupa, and records the larval food plant as *Passiflora tuberosa* Jacquin; Comstock and Vazquez (1961) - description and illustration of an egg; Fassl (1909), brief mention of egg and larva; Klots (1951)- records *Passiflora* as the larval food plant; Fleming (1960)- description of first instar larva; Muller (1886)- description of larval stages, records *Passiflora ichthyura* as the larval food plant; Seitz (1924)- description of larva and pupa, and records larval food plants as *Passiflora vespertilionis* and *P. ichtyura*; Sepp (1855)- description of larval stages; Wolcott (1923)- records *Passiflora* sp. as the larval food plant; Wolcott, (1936)- records *Passiflora* sp. as the larval food plant.

EGG: (Measurements and duration are based on 3 specimens.) Height, 1.3-1.4 mm.; width, 0.8-0.9 mm. Duration of stage, 4 days.

Cylindrical in shape. Outer surface composed of rectangular reticulations (identical with the egg of *H. petiveranus* and thus, no drawings are included here).

Color orangish yellow (more orange than the egg of *H. petiveranus*).

Eggs are deposited on the undersurfaces of the leaves and/or on the new tendrils of *Passiflora biflora* Lam., the same larval food plant as that of *H. petiveranus*. At the Laguna Catemaco Locality (see under *H. petiveranus*), females also oviposited on *P. coriacea* Juss.

FIRST INSTAR LARVA: Fig. 3E. (Measurements and duration are based on 3 specimens.) Beginning of stadium- 2.9 mm.; width, 0.2 mm.; head diameter, 0.2 mm. Termination

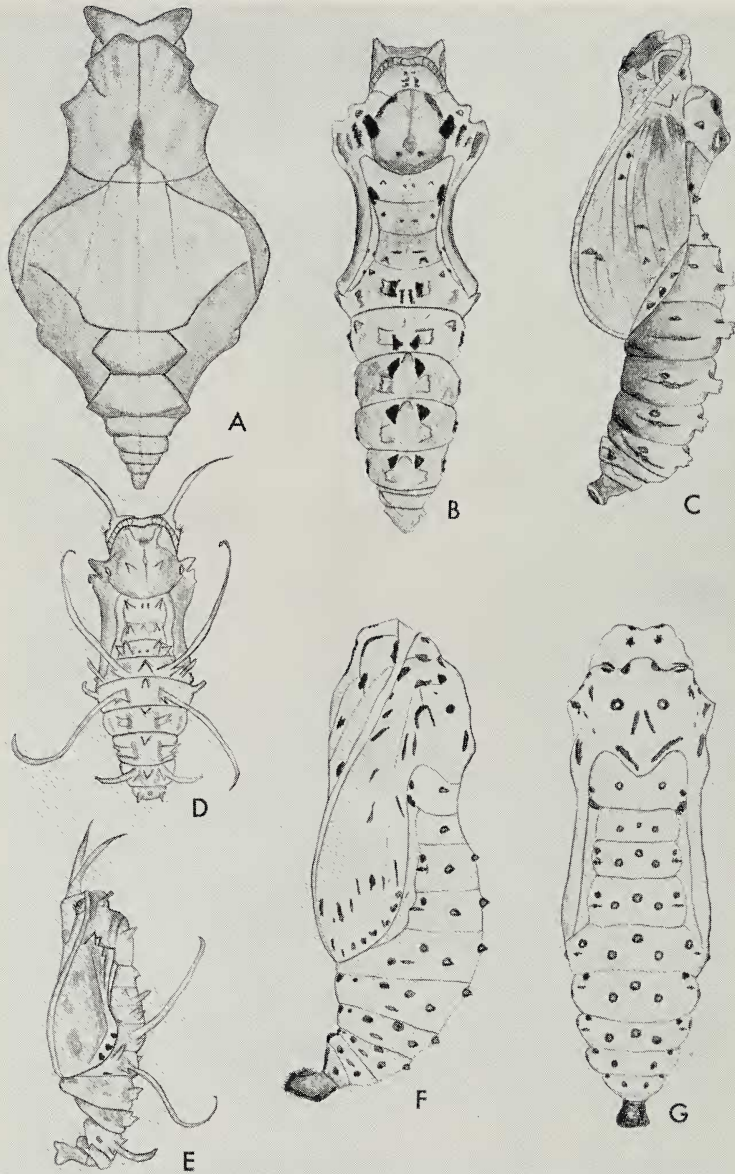


Fig. 6. Pupae: A. *Parides photinus* D.; B. and C. *Dryos julia delila* F.; D. and E. *Eueides cleobaea zorcaon* R.; F. and G. *Chlosyne janais* D.

of stadium-length, 4, 0-4, 1 mm.; width, 0, 4-0, 5 mm. Duration, 3 days.

Head identical with that of *H. petiveranus* (see fig. 5C); coffee brown in color.

Body cylindrical. Segments with paired, simple, black setae; prothoracic- cervical shield with 3 arranged in a triangular pattern, 2 supraspiracular, 2 spiracular; meso- and metathoracic- 1 dorsal, 1 subdorsal, 2 supraspiracular, 1 spiracular; first through eighth abdominal- 1 dorsal, 1 subdorsal (posterior), 1 supraspiracular, 2 subspiracular; ninth abdominal- 1 dorsal, 1 subdorsal, 1 supraspiracular, 1 subspiracular (very short); caudal- suranal plate with 3 long and numerous short setae; suprapedal lobes with setae: 2 on prothoracic and sixth through ninth abdominal, 1 on all other segments.

Ground color taffy brown. Legs and prolegs concolorous with ground color. Spiracles inconspicuous.

Larvae consume shells after hatching.

SECOND INSTAR LARVA: (Measurements and duration are based on 2 specimens.) Beginning of stadium-length, 4, 8-5, 0 mm.; width, 0, 3-0, 6 mm.; head diameter, 0, 7-0, 8 mm. Termination of stadium-length, 7, 9-8, 2 mm.; width, 0, 7-0, 9 mm. Duration, 4 days.

Head the same color and with setae as before except that the apical pair is now replaced by a pair of black, spiny scole, approximately 0, 2 mm. in length.

Body shape as before. Segments with paired, simple, black setae and paired black scole with black spinules: prothoracic-cervical shield divided so that there are 3 distinct setae per side, remainder of segment with 2 supraspiracular setae, 2 spiracular setae, 1 supraspiracular scolus at juncture of pro- and mesothoracic segments; mesothoracic- 1 dorsal- subdorsal scolus, 2 supraspiracular setae, 1 scolus at juncture of meso- and metathoracic segments; metathoracic- 1 dorsal- subdorsal scolus, 2 supraspiracular setae; first through eighth abdominal- 1 dorsal- subdorsal scolus, 1 supraspiracular scolus, 1 subspiracular scolus; ninth abdominal- 1 dorsal- subdorsal scolus, 1 supraspiracular seta; caudal- 1 dorsal seta; 1 supraspiracular scolus, 3 subdorsal setae, suranal plate with numerous setae.

Ground color greenish brown. Bases of scole on second, fourth, and sixth abdominal segments white. Legs black; prolegs concolorous with ground color. Spiracles inconspicuous.

THIRD INSTAR LARVA: (Measurements and duration are based on 2 specimens.) Beginning of stadium-length, 8, 8-9, 1 mm.; width, 1, 0-1, 3 mm.; head diameter, 1, 2-1, 3 mm. Termination of stadium-length, 10, 7-12, 0 mm.; width, 2, 0-2, 5 mm. Duration, 5 days.

Head as before but apical scole slightly longer.

Body shape as before. Paired setae and scole on segments in the same arrangement as before with the following exceptions: prothoracic- 2 dorsal setae, 2 subdorsal setae (all situated on an undivided cervical shield), 2 supraspiracular setae (situated on individual pinacula), 1 supraspiracular scolus at juncture of pro- and mesothoracic segments.

Ground color dark brown. Bases of scole on second, fourth and sixth abdominal segments cream. White specks and thin lines on dorsal and lateral surfaces. Legs, and prolegs as before. Spiracles black.

FOURTH INSTAR LARVA: (Measurements and duration are based on 2 specimens.) Beginning of stadium-length, 13, 0-14, 1 mm.; width, 2, 1-2, 7 mm.; head diameter, 2, 3-2, 5 mm. Termination of stadium-length, 17, 0-18, 4 mm.; width, 2, 4-3, 0 mm. Duration, 4 days.

Head black with apical scole slightly longer than before. Adfrontals lighter than rest of head.

Body shape and with setae and scole as before.

Ground color dark brown with a pinkish tinge, particularly at the segmental junctures. White markings on dorsal and lateral surfaces much more extensive and forming thin, discontinuous, transverse bands. A middorsal, discontinuous longitudinal, white band slightly evident. Legs, prolegs, and spiracles as before.

FIFTH INSTAR LARVA: Fig. 3F. (Measurements and duration are based on 2 specimens.) Beginning of stadium-length, 17, 9-18, 6 mm.; width, 2, 8-3, 5 mm.; head diameter, 3, 3-3, 5 mm. Termination of stadium-length, 33, 1-35, 0 mm.; width, 5, 0-6, 0 mm. Duration, 6-7 days.

Head (Fig. 5J) tricolored- clypeus black, frontals black with cream margins, vertex maroon. Apical scole now approximately 2, 1 mm. in length.

Body shape and with setae and scole as before.

Ground color pinkish grey. Numerous, thin, transverse, black lines on all segments. Lateral portions of segments with 2 small, irregular cream patches near segmental junctures with a maroon patch between. Venter greyish green. Legs (claws black) and prolegs maroon. Spiracles black.

Two days prior to pupation, the larva fastens the caudal segment to a substrate and hangs suspended head downward.

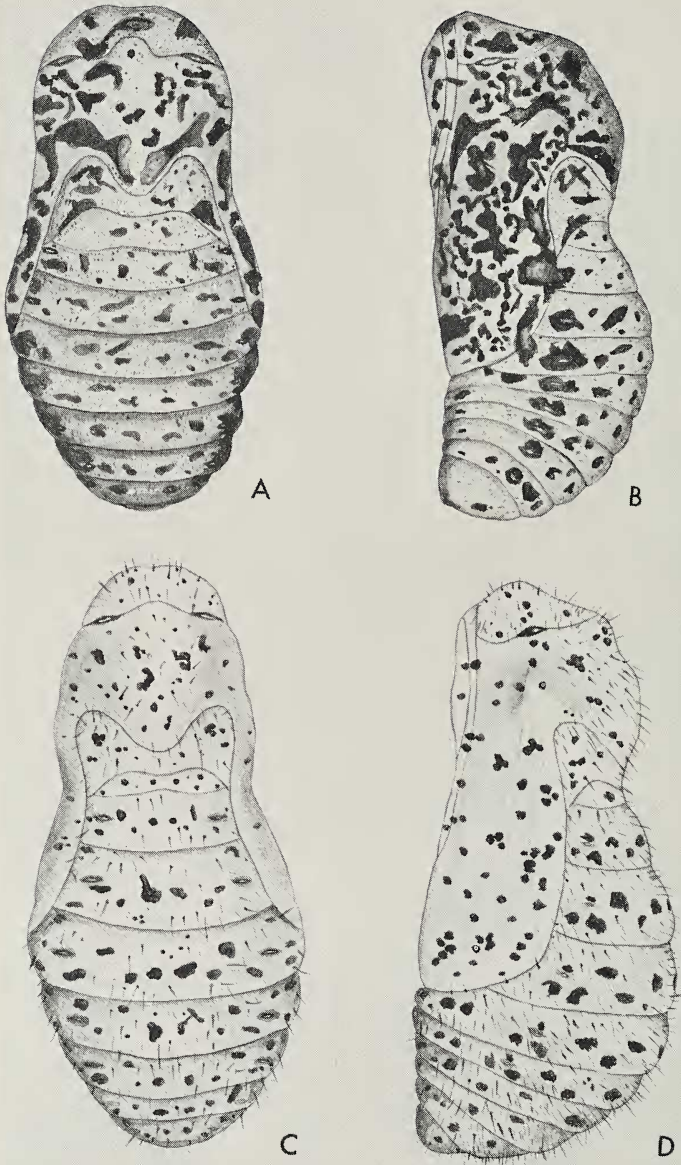


Fig. 7. Pupae: A. and B. *Eumaeus debora* H.; C. and D. *Eumaeus minyas* H.

PUPA: Figs. 6B and C. (Measurements and duration are based on 2 specimens.) Length, 22.0-23.5 mm.; maximum width, 7.0-7.4 mm. duration of stage, 9 days.

Head with 1 pair of slight anterior projections. Antennae extending to wing margins. Proboscis slightly shorter than wing margins.

Prothoracic segment with a middorsal keel and a pair of subdorsal keels. Meso- and metathoracic segments each with a pair of dorsal transparent panes appearing as plates of "mother of pearl". A subdorsal row of small elevated cones on all thoracic segments.

Abdominal segments with a subdorsal keel (these are less pronounced on the first, eighth, and ninth segments).

Ground color brown mottled with various hues of cream, grey, and tan. Wing cases nearly entirely cream.

Pupae made a very audible squeaking sound when it was disturbed.

IMAGO: Fig. 8, F. Adults were abundant in the open, sunny areas in the village and in the surrounding countryside.

Ehrlich (1961) gives the range of this species as southern Florida and southern Texas south throughout the entire Neotropical Region. Hoffmann (1940) states that the subspecies *delila* occurs in all of Mexico.

Euptoieta hegesia hoffmanni W.P. Comstock

There are several references in the literature regarding the life history of this species. However, most of these are just notes as to the larval food plant, *Turnera ulmifolia* L.--yellow primrose (Carpenter and Lewis, 1943; Comstock, 1944; Davenport and Dethier, 1937; Wolcott, 1923; Wolcott, 1936). Swainson (1901) gives a brief description of a larva and pupa; Comstock and Vazquez (1961) describe and picture a second instar larva, a last instar larva and a pupa. Nowhere have I found mention of the egg.

EGG: Fig. 1C. (Measurements and duration are based on 9 specimens.) Height, 0.8-0.9 mm; width, 0.6-0.7 mm. Duration of stage, 4 days.

More or less conical in shape. Outer surface with rectangular reticulations, these less numerous near the micropyle. Micropyle surrounded by an irregular ridge. There is a very close similarity between the egg of *Euptoieta claudia* Cramer as pictured by Comstock (1955) and the egg of this species.

Color milky, light green, the area surrounding the micropyle turning brown on the third day.

Eggs are deposited singly and usually on the undersurfaces of the leaves of *Turnera ulmifolia* L. (Turneraceae). This plant was common in the open areas in the pine woods and in the grassy fields around the village.

Because of several misfortunes, larvae were not sketched.

IMAGO: Fig. 9, A. Adults were abundant in all open areas in and about the village.

Klots (1951) records the subspecies *hoffmanni* as the mainland subspecies getting as far north as Texas. Hoffmann (1940) lists the species as occurring in the entire warm and hot regions of Mexico.

Chlosyne janais (Drury)

To my knowledge, there are but three references in the literature to the immatures of this species: Dyar (1911)- brief description of a larva; Edwards (1888)- brief description of a pupa; Schaas (1883)- brief description of a larva and pupa. There is no mention of the larval food plant.

LAST LARVAL INSTAR: Fig. 2C. (Measurements and duration are based on 11 specimens.) Beginning of stadium (approximate measurements)- length, 28.0-30.0 mm.; width, 3.5-4.0 mm.; head diameter, 3.2-3.6 mm. Termination of stadium- length, 44.0-47.3 mm.; width, 5.0-6.3 mm. Duration (approximate), 8 days.

Head (fig. 5I) bicolored- top half orange, lower half black. Numerous fine, simple, black setae arising from small chalazae.

Body cylindrical. Segments with paired, simple, black setae and paired black scole with black spinules: prothoracic- cervical shield with four small scole and several setae, 1 subspiracular scolus; mesothoracic- 1 subdorsal scolus, 1 supraspiracular scolus, 1 subspiracular scolus (small); metathoracic- 1 subdorsal scolus, 1 supraspiracular scolus, 1 subspiracular scolus; eighth abdominal- 2 dorsal scole (1 anterior, 1 posterior), 1 subdorsal scolus, 1 supraspiracular scolus, 1 subspiracular scolus; ninth abdominal- 1 supraspiracular scolus; caudal- 2 dorsal setae (1 ant., 1 post.), 2 subdorsal setae (1 ant., 1 post.), 1 supraspiracular scolus; suprapedal lobes with paired setae: 1 on pro- and mesothoracic segments, first, seventh, eighth, and ninth abdominal segments; two on metathoracic and second through sixth abdominal segments.

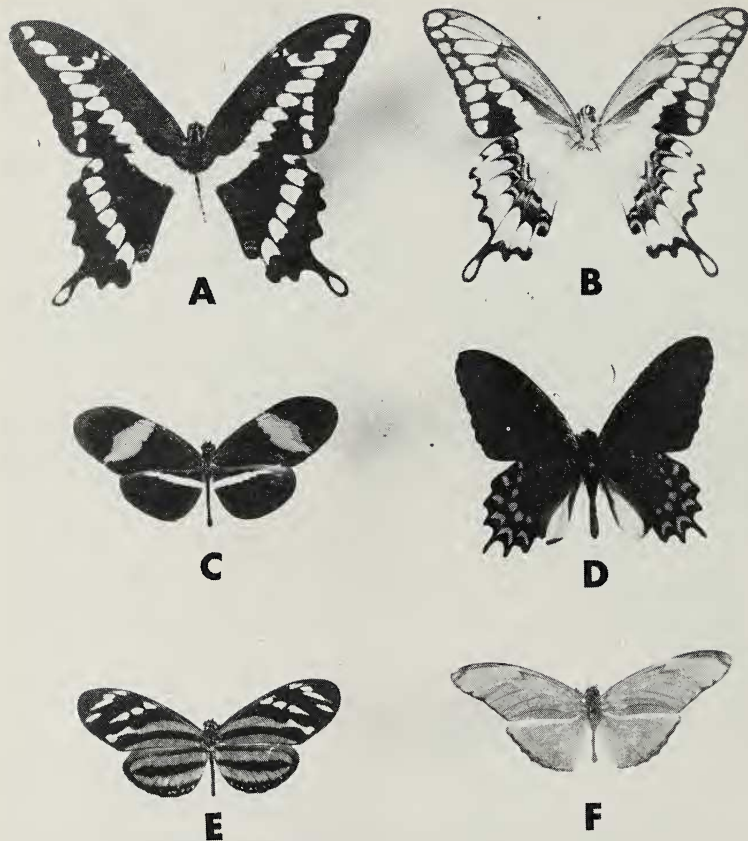


Fig. 8. Adults of: A. *Papilio thoas antocles* R. & J. dorsal and B. ventral; C. *Heliconius petiverannus* R. & J.; D. *Parides photinus* D.; E. *Eueides cleobaea zorcaon* R.; F. *Dryas julia delila* F.

Ground color metallic greyish green. Prothoracic segment light orange. All other segments with: a transverse, glossy black band linking all sclerite; a ventral, discontinuous, longitudinal, glossy black band; numerous thin, transverse glossy black lines. Legs and prolegs black. Spiracles black.

Two days prior to pupation, the larva fastens the caudal segment to the substrate and hangs suspended head downward.

Larvae were found feeding on the undersurfaces of the leaves of *Odontonema callistachyum* (S. and C.) Kuntze (Acanthaceae). This plant was common along the shaded stream banks.

PUPA: Figs. 6F and G. (Measurements and duration are based on 7 specimens.) Length, 17.1-19.8 mm.; maximum width, 5.9-6.8 mm. Duration of stage, 8-9 days.

Antennae and proboscis extending to wing margins.

Thoracic segments with 1 pair of subdorsal, small, glossy black pimples.

Abdominal segments with paired, small, glossy black pimples in the following arrangement: first and second abdominal- 1 dorsal, 1 subdorsal, 1 supraspiracular, 1 subspiracular; fourth through seventh abdominal- 1 dorsal, 1 subdorsal, 1 supraspiracular (reduced to dots), 1 subspiracular (reduced to dots).

Ground color smooth greyish green (slightly lighter than ground color of larvae). Small black lines on head portion. Proboscis covering with black triangular markings (1 per segment), these most conspicuous at terminal portions. Wing cases with several black dashes. Spiracles black.

IMAGO: Fig. 9, B. Adults were common only along streams where the food plant occurred. The closely related species, *C. lacinia* Geyer, was much more numerous than *C. janais*.

Holland (1931) gives the range of this species as "Texas, Mexico, and Central America". Hoffmann (1940) states that the species occurs in the warm and hot regions of Mexico excluding the northeast section.

FAMILY LYCAENIDAE

Eumaeus minyas Hubner

The life history of this species has not been reported previously in the literature.

EGG: Fig. 1D. (Measurements and duration are based on 14 specimens.) Height, 0.5-0.6 mm.; width, 1.2-1.3 mm. Duration of stage, 8-9 days.

Dorso-ventrally flattened, slightly concave on both dorsal and ventral surfaces. Outer surface composed of fine, circular reticulations.

Color light cream, turning pinkish the day prior to larval hatching.

Eggs are deposited usually in clusters of 3-8 on the undersurfaces of the leaves of *Zamia loddigesii* var. *angustifolia* (Regel) Schuster (Cycadaceae). This plant is relatively small (I have never seen an individual greater than one foot in height) and fairly common throughout the pine woods surrounding the village. Each year (March-May) these pine lands are burned by the Indians. This annual burning could easily account for the reduced sizes of the plants. Although the cycads were numerous, it was very hard to acquire *Eumaeus* eggs and larvae. It appears that the female butterflies only oviposit on the tender new fronds that at the time of my visit (June-August) were very difficult to locate.

FIRST INSTAR LARVA: Fig. 4A. (Measurements and duration are based on 19 specimens.) Beginning of stadium-length, 2.0-2.1 mm.; width, 0.2-0.3 mm.; head diameter, 0.3 mm. Termination of stadium-length, 4.0-4.2 mm.; width, 1.1-1.2 mm. Duration, 2 days.

Head (Fig. 5E) brownish orange. Several minute, tan setae on clypeus and labrum and on frontals. Ocelli brown.

Body dorso-ventrally compressed. Segments with paired, simple black setae; prothoracic-cervical shield with 2 dorsal, 4 subdorsal, remainder of segment with 5 supraspiracular, 1 spiracular, 2 subspiracular; mesothoracic- 2 dorsal, 2 subdorsal, 2 supraspiracular; metathoracic- 5 dorsal- subdorsal, 2 supraspiracular, 4 spiracular- subspiracular; all abdominal- 6 subdorsal-subdorsal, 2 supraspiracular, 4 subspiracular; all segments (except the prothoracic) with a small, elevated inconspicuous, transverse ridge appearing gelatinous and clear.

Ground color brownish orange (concolorous with head color) turning reddish on second day. Areas beneath the previously described ridges on the metathoracic through the sixth abdominal segments become white on the second day, the white not confined to the entire ridge area but so situated as to give the impression of a series of "figure 8's", one per segment. Legs and prolegs concolorous with ground color. Spiracles inconspicuous.

Larvae do not consume shells.

SECOND INSTAR LARVA: (Measurements and duration are based on 18 specimens.) Beginning of stadium-length, 4.2-4.3 mm.; width, 1.3-1.4 mm.; head diameter, 0.9-1.0 mm. Termination of stadium-length, 7.5-8.1 mm.; width, 2.3-2.6 mm. Duration, 2 days.

Head as before.

Body dorso-ventrally compressed with lateral expansions now very evident. Prothoracic segment with cervical shield and setae as before. All other segments with numerous fine, simple, black setae, these not confined to any particular arrangement except that they are less numerous near the segmental junctures. There is a predominance of slightly longer setae on the terminal portions of the ridges. These terminal areas now appear as small verrucae.

Ground color brilliant, glossy, strawberry red. Ridges still clear and gelatinous looking, however, the "figure 8" markings beneath the metathoracic through the sixth abdominal segments are now cream. Legs, prolegs, and spiracles as before.

THIRD INSTAR LARVA: (Measurements and duration are based on 13 specimens.) Beginning of stadium-length, 10.9-11.6 mm.; width, 2.6-2.8 mm.; head diameter, 1.6-1.9 mm. Termination of stadium-length, 15.0-16.2 mm.; width, 4.7-5.0 mm. Duration, 3-4 days.

There is no apparent change from the last instar with the exception that the markings beneath the ridges are now medium yellow.

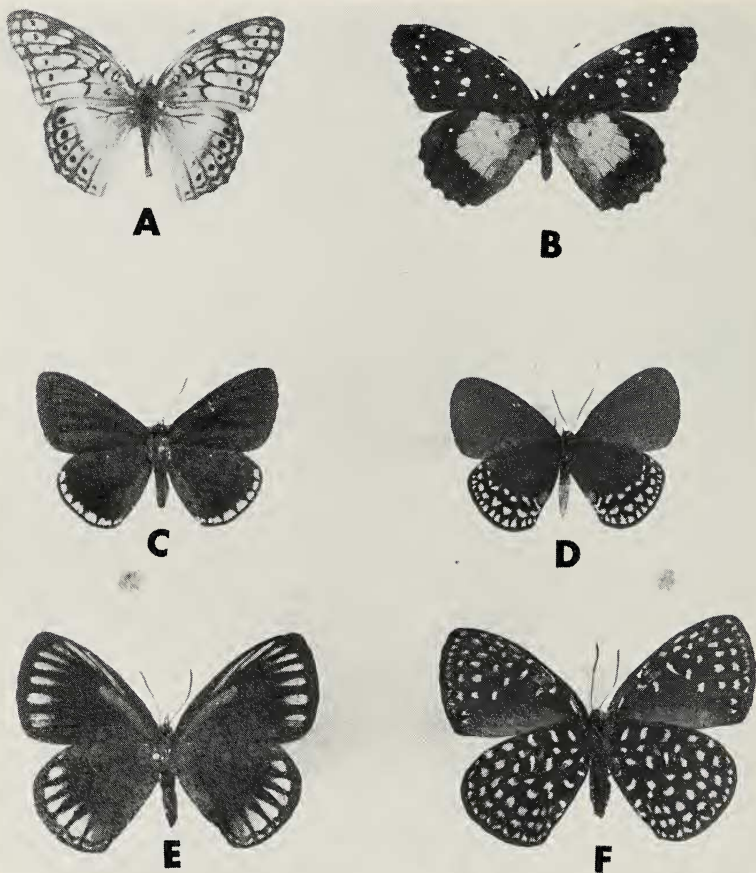


Fig. 9. Adults of: A. *Euptoieta hegesia hoffmanni* W.P.C.; B. *Chlosyne janais* D.; C. and D. *Eumaeus minyas* H.; E. and F. *Eumaeus debora* H.

By the time this stage is reached, the larvae in nature are often in a precarious situation. The new fronds of the plants have been consumed, leaving the older, thick, leathery ones. The latter are apparently unsuitable as food for the larvae probably resulting from an inability of the larval jaws to cut these older, leathery tissues. They do not feed on these older tissues but instead abandon the plants and crawl along the ground in search of other plants that might have new, fresh foliage. This phenomenon has been reported by Schwarz (1888) for larvae of *Eumaeus atala* Poey, a species that occurs in the pine lands of southern Florida. To be sure, a majority of the *E. minyas* caterpillars probably perish at this time for although *Zamia* grows in clumps (individual plants are usually 5-10 feet apart), there might not be a plant with new foliage for distances as great as 60-100 feet. The probability of a caterpillar which is wandering about at random finding such a plant seems far from good. In addition, a great many larvae probably perish during the annual spring burnings which were mentioned above.

I saw caterpillars crawling along the ground on only two occasions. However, I often observed plants with recently defoliated new fronds and noticed that no larvae were present on the older, uneaten foliage. The Popolocas who say that they frequently see the brilliantly colored "gusanos" crawling on the ground, associate this behavior with this particular species.

FOURTH INSTAR LARVA: Figs. 4 B and C. (Measurements and duration are based on 11 specimens.) Beginning of stadium- length, 16.6-17.7 mm.; width, 6.0-6.9 mm.; head diameter, 3.1-3.3 mm. Termination of stadium-length, 25.2-27.0 mm.; width, 8.1-9.5 mm. Duration, 8-9 days.

Head (Fig. 5H) with more setae than before.

Body with no apparent change from the previous stage.

It is interesting to note here that larvae in captivity accepted the fresh fronds of *Ceratozamia mexicana* (the food plant of the larvae of *Eumaeus debora*, which is discussed below) without any hesitancy.

The larva discontinues eating 3 days prior to pupation. Two days prior, it fastens the caudal segment to the substrate and spins a thoracic girdle consisting of several silken threads. This caudal attachment is very insecure and practically all of my specimens wound up dangling in mid air, the thoracic threads being the only means of support. This "breaking loose" probably occurs in the field as well; the only chrysalid taken in the field was brought to me after being found lying unattached on the ground.

PUPA: Figs. 7C and D. (Measurements and duration are based on 10 specimens.) Length, 15.1-16.0 mm.; maximum width, 7.0-7.9 mm. Duration of stage, 14 days.

Antennae extending to wing margins. Proboscis slightly shorter than wing cases.

Ground color a uniform glossy brownish orange. The yellow bands of the last instar (beneath the ridges) very conspicuous for the first 24 hours following the last molt but disappear entirely after that time period. Numerous black dots and blotches on all surfaces forming dorsal, subdorsal, supraspiracular, spiracular, and subspiracular rows. Dense, fine, simple, tan, setae on all surfaces except the wing cases. Spiracles black and conspicuous.

Dr. J. Downey (personal communication) informs me that the pupa has a stridulatory organ between the fifth and sixth abdominal tergites. This sound producing organ which is apparently widespread in the Lycaenidae will be described by him in his forthcoming paper on that subject. I did not notice any sound being produced by my pupae in the field.

IMAGO: Fig. 9 CD. Adults were extremely numerous in the pine lands. This species must have an extremely high reproductive potential for despite the apparently high larval mortality rate as a result of the annual forest burnings, an inadequate supply of acceptable food, and presumably heavy predation (occurring when the larvae are crawling along the ground), the species is by no means on the verge of extinction in the Ocotil area. Undoubtedly the relatively short duration of the larval stage requiring but 15 days is a distinct advantage to this species and an adaptation to the particular environment.

Adults were not confined to the pine lands exclusively but were found in the deciduous, tropical forests in the ravines. No cycads grew in these habitats so that the distribution of the adults is not restricted by the distribution of the larval host plant.

Holland (1931) states that this species is "common from southern Texas to northern Argentina". Hoffmann (1940) states that the species occurs in Mexico in the warm and hot coastal regions and in Yucatan.

Eumaeus debora Hubner

Two authors have made mention of the immatures of this insect: Murillo (1902)- describes a larva, pupa and records the larval food plants (plants under cultivation) as *Dioon edule*, *Cycas revoluta*, and *Macrozamia* sp.; Comstock (1948)- illustrates a larva and pupa of this species and lists the food plant as the cycad *Dioon edule* Lindl. His descriptions were based on specimens that were taken in northeastern Mexico. These descriptions do not correlate exactly with mine, a matter which might be attributed to geographic variation.

EGG: Fig. 1E. (Measurements based on 9 specimens.) Height, 0.4-0.5 mm.; width, 0.9-1.0 mm. Duration of stage unknown because of nonviable material.

Dorso-ventrally flattened, slightly concave on both dorsal and ventral surfaces. Outer surface composed of fine, reticulations in the form of small six-rayed stars.

Color a dull white.

Eggs are deposited in clusters (may go over 50) usually on the undersurfaces of the leaves of *Ceratozamia mexicana* Brongn. (Cycadaceae) but sometimes on the reproductive cones. It appears that females (similar to the females of *E. minyas*) "prefer" to oviposit on the very new, fresh fronds. These plants (which may attain a height of 3-4 feet) grew in small, localized clusters in the virgin rain forest on the upper slopes of the volcano, I failed to find plants below 3000 feet in elevation.

THIRD INSTAR LARVA (presumably): (Measurements and duration are based on 5 specimens.) Beginning of stadium- length, 9.1-9.8 mm.; width, 2.6-3.0 mm.; head diameter, 1.9-2.0 mm. Termination of stadium- length, 18.0-18.9 mm.; width, 4.4-5.1 mm. Duration, 6 days.

Head brownish orange with a few very fine setae, particularly on the clypeus and labrum. Ocelli brown.

Body slightly dorso-laterally flattened and with lateral expansions. Prothoracic segment with triangular cervical shield; shield with numerous small, simple, black setae. All segments each with a small, elevated, transverse ridge in posterior portion of segment appearing gelatinous and clear. These ridges rise at terminal portions into small verrucae bearing numerous, black setae in no apparent arrangement except that they are less numerous on the segmental junctures.

Ground color a glossy carmine (Comstock, 1948, reports the color as scarlet), the red far less vivid and the gloss far less pronounced than with *E. minyas*. White markings (Comstock, 1948, reports orange-yellow markings) beneath meso-thoracic segment through the seventh abdominal segment with the following shapes: mesothoracic- two diagonal patches; metathoracic- an elongated lopsided "figure 8"; seven abdominal- rounded bars.

Larvae are apparently gregarious: the 5 specimens listed above were found together on the undersurface of a single cycad leaflet.

FOURTH INSTAR LARVA (presumably): Fig. 2F. (Measurements and duration are based on 5 specimens.) Beginning of stadium- length, 19.0-20.1 mm.; width, 6.1-6.0 mm.; head diameter, 3.0-3.3 mm. Duration, 8-9 days.

Head appears to be indistinguishable from that of *E. minyas* (consult fig. 5H).

Body shape and with markings as before. Claws of legs black. Prolegs as before. Spiracles dark brown.

The larva discontinues feeding 3 days prior to pupation. On the second day before pupation, the lateral portions of the meso- and metathoracic segments take on a brownish tinge and the segmental junctures between these same two segments take on a sky blue color (beneath the ridge).

The larva attaches to the undersurface of the cycad leaf by fastening the caudal segment and by spinning a girdle of several silken threads around the thoracic portion. As with *E. minyas*, the caudal attachment is not very secure.

PUPA: Figs. 7A and B. (Measurements and duration are based on 4 specimens.) Length, 19.5-20.9 mm.; maximum width, 9.5-9.9 mm. Duration of stage, 13-14 days.

Antennae extending to wing margins. Proboscis slightly shorter than wing cases.

Ground color uniform glossy brownish orange, slightly darker than the pupa of *E. minyas*. The nine white bands of the last instar (beneath the ridges) are very conspicuous for the first 24 hours following pupation but disappear entirely after that time period (Comstock, 1948, pictures a pupa with the bands still evident). Numerous irregular black blotches and dots on all surfaces (much more numerous than on *E. minyas*) forming multiple dorsal, subdorsal, supraspiracular, and subspiracular rows. Numerous, very fine, tan setae (hairs) on thoracic and abdominal segments (Comstock, 1948, reported hairs only on the thoracic segments), these non-evident except under microscopic magnification.

Pupae are found in groups. I have found as many as 37 pupal cases in close association.

Dr. J. Downey (personal communication) informs me that the pupa has the stidulatory organ between the fifth and sixth abdominal tergites and that the organ is much more evident in this species than it is in *E. minyas*.

IMAGO: Fig. 9, E. Adults were common only in or in the immediate vicinity of the virgin forests on the upper slopes of the volcano and only in relatively close proximity to the cycad hosts. They did not fly in the shaded depths of the forest but occurred in small, sunny openings existing as a result of fallen trees or landslides. On several occasions, I saw individuals flying 15-20 feet above the crater rim at an elevation of 5100 feet.

Hoffmann (1940) gives the range in Mexico of this species as the eastern mountain system as far north as southern Tamaulipas as well as Oaxaca, Puebla, the Central Plateau region, the Valley of Mexico, the mountains of Guerrero and Morelos. My specimens from the Sierra Tuxla represent the most southeastern record of this species in Mexico.

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